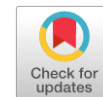


■ ORIGINAL RESEARCH ARTICLE

Price Dynamics and Competitiveness in the Croatian Milk and Meat Sectors



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Abstract

Purpose: This study analyzes market developments in the Croatian milk and meat sectors from 2015 to 2024, focusing on price movements, foreign trade, and selected structural factors related to competitiveness. **Design/Methodology:** The paper uses secondary data from national and international statistical and institutional sources, supplemented by publicly available trade data. The analysis combines descriptive statistics with year-on-year indicators, three-year moving averages, index analysis, and non-parametric tests. **Findings:** Milk prices remained relatively stable until 2020, then increased sharply, with the largest annual rise in 2022 (25.69%), before declining slightly in 2024 (–3.61%). The post-2020 increase was statistically significant ($p = .0095$). Meat prices rose more gradually, but the upward trend was evident across all categories and was also statistically significant. Among meat categories, poultry recorded the highest relative price growth compared with 2015, while beef showed the largest absolute increase. During the observed period, imports of both milk and meat generally grew more strongly than exports, indicating rising import dependence and persistent structural weaknesses in domestic production. **Practical Implications:** The findings may help producers, processors, and policymakers assess pricing pressures, investment needs, and measures to improve productivity and reduce exposure to market shocks. **Originality/Value:** This study provides an integrated view of price and trade developments in the Croatian milk and meat sectors over a ten-year period and relates these trends to broader issues of competitiveness, market vulnerability, and structural adjustment.

Keywords: price dynamics, agricultural competitiveness, import dependence, milk market, meat market

JEL codes: Q13, Q17, F14

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Conflicts of interest: The authors declare no conflicts of interest.

Ethics statement: This study is based exclusively on secondary, publicly available statistical and institutional data and did not involve human participants, animal subjects, surveys, interviews, or personal data collection. Therefore, ethics approval and informed consent were not required.

Sex and Gender Reporting (SAGER statement): Sex and gender were not relevant variables in this study because the analysis focuses on aggregate market, price, trade, and structural data for the Croatian milk and meat sectors. Therefore, sex- or gender-disaggregated analyses were not applicable.

AI tools declaration: No AI tools were used for scientific content generation, data analysis, interpretation, conclusions, or manuscript preparation. All scientific content remains the responsibility of the authors.

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1. Introduction

The milk and meat sectors are core pillars of the Croatian agri-food system, contributing significantly to agricultural output, rural employment, and food security. Milk quality management connects producers and consumers through product safety, nutritional value, and market-recognized quality attributes (Kristić et al., 2015). Livestock production also supports the economic viability of rural areas and sustains interconnected value chains in food processing and trade, making developments in these sectors relevant for agricultural policy, business performance of farmers, market coordination, and long-term competitiveness.

Since Croatia's accession to the European Union, the milk and meat sectors have become increasingly integrated into the single market, with the Common Agricultural Policy shaping production incentives, market structures, and integration patterns. Despite ongoing policy support, livestock production in Croatia continues to face structural constraints, including fragmented farm structures, small average farm sizes, limited capital intensity, and relatively slow technological adoption. This interpretation aligns with broader evidence for EU agriculture, which shows that farm structural change in newer member states is strongly influenced by prices, subsidies, income, and macroeconomic conditions (Neuenfeldt et al., 2019). These characteristics have contributed to weak concentration at the primary production level and limited bargaining power for producers within vertically coordinated supply chains. Evidence from European food value chains suggests that cooperative organization may affect markups and bargaining conditions, although its effects on markup volatility are not uniform across sectors and chain levels (Lee & Van Cayseele, 2024). As a result, productivity growth and international competitiveness remain constrained, reducing the ability of domestic producers to absorb external market pressures and cost shocks.

Price formation in the milk and meat sectors is strongly influenced by developments in European and global markets, reflecting a high degree of market integration. Persistent price differentials between domestic and imported products may indicate structural competitiveness gaps and asymmetries in cost structures rather than isolated market distortions. These dynamics increase exposure to price volatility and reinforce the vulnerability of domestic production systems, particularly in the absence of effective risk management instruments and coordinated market strategies. These vulnerabilities became more apparent after 2020, when global agri-food markets were affected by supply chain disruptions, sharp increases in input costs, and heightened geopolitical uncertainty. In Croatia, the effects of these shocks were magnified by pre-existing structural weaknesses, especially among smaller and less capital-intensive producers. At the same time, more intensive and vertically integrated production systems, such as poultry, tend to display greater price stability than sectors with longer biological cycles, such as beef and pork production (Kranjac et al., 2021). From a business and managerial economics perspective, developments in the milk and meat sectors are closely linked to market structure, value chain organization, and firms' ability to manage price and trade-related risks. Evidence from European dairy industries shows that dairy prices and processing margins directly affect operational performance, with smaller and less flexible firms particularly exposed to commodity risk (Bagnarosa et al., 2022). Increasing price volatility, along with growing import dependence, directly affects the cost structures, margins, and investment decisions of farms, processors, and downstream market actors. In this environment, competitiveness depends on production efficiency and the ability to adapt to fluctuating input prices, negotiate contractual arrangements within supply chains, and respond strategically to foreign competition.

Given this context, a comprehensive analysis of production and market trends in the Croatian milk and meat sectors is both timely and necessary. Although previous studies have examined agricultural competitiveness, policy impacts, and trade integration, there is still a lack of integrated empirical assessment that simultaneously considers price dynamics, foreign trade developments, and structural patterns over a longer time horizon. The purpose of this study is to provide an evidence-based assessment of market developments affecting the competitiveness of the Croatian milk and meat sectors. Accordingly, the aim of the paper is to analyze market trends in these sectors during the period 2015–2024, with particular emphasis on price movements, foreign trade flows, and structural features affecting competitive performance. By situating national developments within a broader European and global context, the paper contributes to a business-oriented understanding of sectoral resilience, market risk, and competitive pressures in a small open economy (Krugman et al., 2022).

In this respect, the paper is also relevant to the broader field of business excellence, as it shows how market volatility, trade exposure, and structural constraints shape performance, pricing decisions, and long-term competitiveness in agri-food value chains.

2. Literature Review

The milk and meat sectors are important components of the Croatian agri-food system contributing to agricultural output, rural employment, and food security. Livestock production supports rural incomes and is connected to food processing and trade (Volk et al., 2019). After Croatia joined the European Union, the milk and meat sectors became more influenced by the Common Agricultural Policy (CAP), which affected incentives, market conditions, and structural adjustment in agriculture (Kranjac et al., 2021; Vale, 2018). Despite policy support, Croatian livestock production has faced persistent structural challenges over the past decade, including a fragmented farm structure, relatively small average farm size, limited capital intensity, and slower technological adoption compared to leading EU producers (Hadelan et al., 2022; World Bank, 2019). These structural characteristics have constrained productivity

growth and reduced producers' capacity to absorb market shocks, contributing to declining livestock numbers in certain subsectors and increasing reliance on imported milk and meat products (Fi-compass, 2020; Kovachevikj et al., 2025). In the broader Croatian context, competitiveness has also been discussed in relation to innovation capacity and the ability of firms and sectors to respond to changing market conditions, which remains relevant for structurally exposed segments such as livestock production (Duspara et al., 2017). As a result, domestic producers are often exposed to intense price competition from imports, which may be produced under different cost structures and regulatory conditions (Krugman et al., 2022).

Price formation in the milk and meat sectors is particularly sensitive to both domestic and international factors. Previous research revealed that agricultural producer prices in Croatia are strongly influenced by developments in EU and global markets, especially in the context of trade liberalization and integrated supply chains (Rukavina, 2022; Mikulić et al., 2023). Persistent price differentials between domestic production and imported products have raised concerns regarding market distortions and unfair trading practices, including potential dumping, although the existence of price gaps alone does not constitute proof of anti-competitive behavior (Butorac Malnar et al., 2021). Nevertheless, such differences warrant systematic monitoring due to their potential impact on domestic production viability and long-term competitiveness. On the demand side, recent Croatian evidence shows that consumer attitudes toward fresh pork are influenced by sustainability concerns, product attributes, and breed-specific awareness, which may also shape market opportunities for differentiated domestic pork products (Jelić Milković et al., 2026).

The post-2020 period has marked a significant turning point for agricultural markets globally and within the European Union. The COVID-19 pandemic disrupted food supply chains, altered consumption patterns, and increased insecurity in agri-food systems (Organisation for Economic Co-operation and Development [OECD], 2022; Organisation for Economic Co-operation and Development & Food and Agriculture Organization of the United Nations [OECD & FAO], 2023). Evidence from European agriculture indicates that the COVID-19 shock primarily revealed crisis-response capabilities and robustness, while deeper capabilities remained less developed, highlighting persistent structural vulnerabilities in agri-food systems (Meuwissen et al., 2021). These disruptions were followed by sharp increases in energy, feed, and fertilizer costs, as well as geopolitical shocks in 2022 that further destabilized commodity markets (Food and Agriculture Organization of the United Nations [FAO], 2023; European Commission, 2024). As a consequence, producer prices for milk and meat rose significantly across Europe, although the magnitude and persistence of these increases varied across countries and product categories, reflecting differences in production systems and market integration (FAO, 2025). Croatian pig production was additionally affected by African swine fever after its detection in June 2023, while broader market pressures in the pig meat sector were reinforced by weaker export conditions, disease-related disruptions, and the consequences of the post-pandemic and geopolitical shock environment (OECD, 2023, 2025). In Croatia, these global shocks interacted with existing structural vulnerabilities, amplifying price volatility and trade imbalances in the milk and meat sectors. Studies emphasize that smaller and less capital-intensive farms are particularly exposed to rapid cost increases and limited bargaining power within supply chains, which can accelerate market exit and deepen import dependence (Hadelan et al., 2022; World Bank, 2019). The changes that took place in the Croatian agricultural sector during and after the EU accession period were broadly similar to those observed in other Central and Eastern European member states. Similarities are particularly evident in neighboring countries such as Hungary and Slovenia, which maintained producer prices close to EU levels prior to accession. In addition, the available evidence points to a strengthening of crop production relative to livestock production. Kranjac et al. (2020) further show that the positive effects of EU integration on

Croatian agriculture became more visible only after an initial adjustment period, while simulations of future market developments suggest that Croatia shares several similarities with the EU-13 member states.

3. Methodology

This study analyzes secondary data collected from relevant and reliable official national and international sources. It examines production and market trends in the milk and meat sectors in the Republic of Croatia, including price movements, foreign trade, and the structure of domestic supply. The main sources for the dairy sector were the Monthly Report on the Raw Milk and Dairy Products Market published by the Ministry of Agriculture of the Republic of Croatia ([Ministarstvo poljoprivrede Republike Hrvatske, 2023b](#)), which provides current indicators for the dairy sector, the annual national agricultural report, Annual Report on the State of Agriculture in 2020 ([Ministarstvo poljoprivrede Republike Hrvatske, 2021](#)), and database of the Croatian Bureau of Statistics ([2024](#)), with particular emphasis on agricultural prices. For meat prices, additional data were taken from the Annual Report on the State of Agriculture in 2022 ([Ministarstvo poljoprivrede Republike Hrvatske, 2023a](#)), the Annual Report on the State of Agriculture in 2023 ([Ministarstvo poljoprivrede Republike Hrvatske, 2024](#)), and market reports on livestock, meat and meat products, as well as wholesale prices of table eggs and poultry meat, published by Tržišni cjenovni informacijski sustav u poljoprivredi ([TISUP, 2025a, 2025b, 2026](#)). Foreign trade data were additionally retrieved from the TrendEconomy database using HS 0401 for milk ([TrendEconomy, n.d.-a](#)), HS 0207 for poultry ([TrendEconomy, n.d.-b](#)), HS 0203 for pork ([TrendEconomy, n.d.-c](#)), and HS 0201–0202 for beef ([TrendEconomy, n.d.-d, n.d.-e](#)).

The analyzed data enabled an assessment of the structure and dynamics of the milk and meat sectors, including trends in domestic production, price changes, and broader economic factors influencing the sustainability and competitiveness of the Croatian agri-food market. All data were sourced exclusively from official national statistics, public institutional reports, and official market information systems. The main categories of collected data included monthly and annual prices of raw milk and meat by product type and category, as well as foreign trade indicators for selected agricultural products and sectors, including cow's milk, pork, and beef. The temporal scope of the data spans the period from 2015 to 2024, which made it possible to identify both short-term fluctuations and longer-term developments within the Croatian agri-food sector. In the meat sector, the available official series included purchase prices and wholesale prices, depending on product category and source.

Descriptive statistical methods were used to characterize the analyzed variables. Numerical variables were presented using arithmetic means, medians, standard deviations (*SD*), and interquartile ranges, depending on data distribution. Normality was assessed using the Shapiro–Wilk test ($p < .05$). As most variables did not follow a normal distribution, non-parametric statistical tests were applied. Differences in prices between two time periods were examined using the Mann–Whitney *U* test, while comparisons involving more than two groups were analyzed using the Kruskal–Wallis test. Statistical significance was defined as $p < .05$.

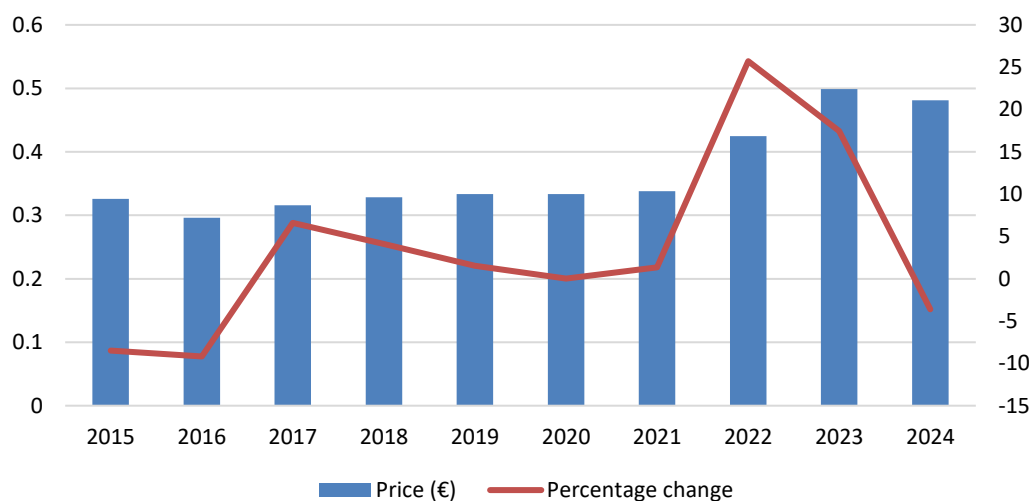
Time trend analysis was conducted using year-on-year (YoY) price change indicators, three-year moving averages, and index analysis with 2015 as the base year (index = 100), allowing an assessment of relative price changes over time. Data organization and visualization were performed using Microsoft Excel, while advanced statistical analyses were conducted in IBM SPSS Statistics 27.

4. Results

The analysis revealed that milk prices during the initial observation period (2015–2020) fluctuated within a relatively narrow range. The most significant decline occurred in 2016 (−9.18%), followed by moderate price growth in the following years (Figure 1). After 2020, a clear upward trend emerged, reaching a peak in 2022 with a year-on-year increase of 25.69%. In 2024, milk prices declined for the first time after three consecutive years of growth (−3.61%).

Figure 1

Average Purchase Price of Milk by Year (2015–2024)



Note. Authors' calculation based on Croatian Bureau of Statistics (2024).

The analysis in Table 1 provided basic descriptive statistics for the observed milk prices. The arithmetic mean is €0.368, while the median is €0.333, indicating slight asymmetry, with higher prices in recent years. The standard deviation is €0.073, suggesting moderate price variability over the ten-year period.

Table 1

Descriptive Statistics of Milk Prices

Statistical measure	Value (€)
Arithmetic mean	0.368
Median	0.333
Standard deviation	0.073

Note. Authors' calculation based on Croatian Bureau of Statistics (2024).

The analysis showed that moving average prices remained stable until 2020, then increased rapidly, especially from 2021 to 2023, when the highest index value was recorded (153.14 in 2023). According to Table 2, in 2024 both the price and the index decreased (147.62).

Table 2
Year-on-Year (YoY) Analysis and Trends in Milk Prices

Year	Price (€)	Annual change (%)	Moving average 3y (€)	Index (2015 = 100)
2015	0.32585	—	—	100.00
2016	0.29594	-9.18	—	90.82
2017	0.31554	6.62	0.31244	96.84
2018	0.32843	4.09	0.31330	100.79
2019	0.33342	1.52	0.32580	102.32
2020	0.33344	0.01	0.33176	102.33
2021	0.33800	1.37	0.33495	103.73
2022	0.42483	25.69	0.36542	130.38
2023	0.49902	17.46	0.42062	153.14
2024	0.48103	-3.61	0.46829	147.62

Note. Authors' calculation based on Croatian Bureau of Statistics (2024). The 3-year moving average is calculated as the mean of three consecutive annual values; the index is expressed relative to the base year 2015 (2015 = 100).

The analysis in Table 3 showed that the median milk price in the first period was €0.32414, whereas in the second period it increased to €0.45293; this difference was statistically significant ($p = .0095$).

Table 3
Comparison of Milk Prices by Period

Comparable periods	Number of years (n)	Median price (€)	p
2015–2020	6	0.32414	.0095
2021–2024	4	0.45293	

Note. Authors' calculation based on Croatian Bureau of Statistics (2024), n = number of years. p value was obtained using the Mann–Whitney U test.

Wholesale prices were higher than purchase prices in the years for which data were available (Table 4).

Table 4
Average Wholesale Prices of Permanent Milk (2.8% Milk Fat), 2015–2024

Year	Price (€)
2015	0.79
2016	0.76
2017	–
2018	–
2019	–
2020	–
2021	–
2022	–
2023	0.79
2024	0.76

Note. Authors' calculation based on Ministarstvo poljoprivrede Republike Hrvatske (2023b) and TISUP (2026). No publicly available data were identified for 2017–2022.

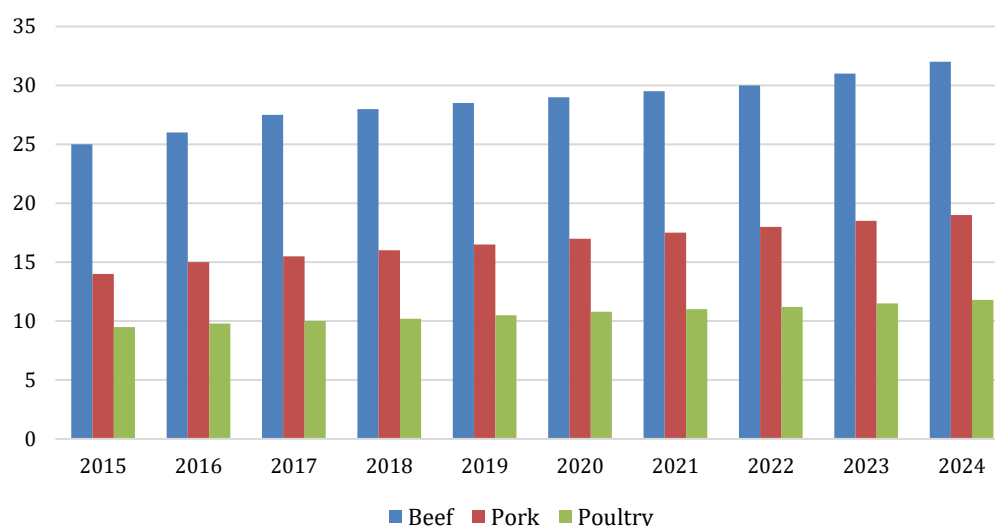
Analysis of data on milk imports and exports in the Republic of Croatia in the period from 2015 to 2020 indicates a trend of continuous increase in the quantity of imported milk (Table 5). Milk imports in 2015 amounted to 207 939 tons, while by 2020 they had increased to around 252 300 tons, which represents an increase of almost 21.4% in just five years. At the same time, milk exports have also been growing, from 35 533 tons in 2015 to around 60 000 tons in 2020, which is an increase of 68.8%. Throughout the observed period, the average price of imported milk was systematically lower than the average export price, ranging from 2 to 3 €/100 kilograms. In 2015, the import price was around €25/100kg, while the export price was around €28/100kg. A similar pattern is repeated in the following years: in 2018, the import price was around €27, while it was exported at a price of €30/100kg, and in 2020 the difference reaches even €3.00. Milk foreign trade data were available only for 2015–2020; therefore, these results should be interpreted as a partial trade perspective within the broader 2015–2024 analytical framework.

Table 5
Foreign Trade in Milk (2015–2020)

Year	Milk import (tons)	Milk exports (tons)	Approx. avg. export price (€/100 kg)	Approx. avg. import price (€/100 kg)
2015	207 939	35 533	28.0	25.0
2016	237 885	46 836	28.8	26.0
2017	255 125	50 243	29.0	26.5
2018	273 446	55 891	30.0	27.0
2019	210 429	41 139	29.5	26.5
2020	252 300	60 000	30.5	27.5

Note. Authors' calculation based on TrendEconomy trade data for Croatia, HS 0401 (milk and cream, not concentrated nor containing added sugar or other sweetening matter) (TrendEconomy, n.d.-a). Approximate average export and import prices are expressed in €/100 kg.

Figure 2
Average Purchase Prices of Meat (€/kg) (2015–2024)



Note. Authors' calculation based on Ministarstvo poljoprivrede Republike Hrvatske (2023a, 2024); TISUP (2025a); TISUP (2025b).

Average purchase prices of meat in the period from 2015 to 2024 show a stable and gradual growth in all three categories, beef, pork and poultry (Figure 2). Beef continues to have the highest absolute value, while poultry is the most affordable, with the lowest annual prices.

Annual changes in beef prices in Table 6 show moderate growth in the early period, with increases of 2.63% in 2016 and 7.69% in 2017, followed by relatively stable growth of about 2–3% until 2020. A more pronounced upward trend appears after 2021, with prices rising by 6.67% in 2021 and peaking at 14.58% in 2022. Growth remained strong in subsequent years, reaching 9.09% in 2023 and 5.00% in 2024. The three-year moving average rose steadily from 3.97 €/kg in 2017 to 5.93 €/kg in 2024, indicating sustained long-term growth. Similarly, the price index (2015 = 100) increased from 100 to 165.8, confirming a total rise of 65.8% over the observed period. Overall, the data show a shift from stable to accelerated price growth, especially after 2021.

Table 6
Annual Changes in Beef Purchase Prices and Trends (2015–2024)

Year	Beef (€/kg)	Change (%)	Moving average 3y (€)	Index (2015=100)
2015	3.8	—	—	100.0
2016	3.9	2.63	—	102.6
2017	4.2	7.69	3.97	110.5
2018	4.3	2.38	4.13	113.2
2019	4.4	2.33	4.30	115.8
2020	4.5	2.27	4.40	118.4
2021	4.8	6.67	4.57	126.3
2022	5.5	14.58	4.93	144.7
2023	6.0	9.09	5.43	157.9
2024	6.3	5.00	5.93	165.8

Note. Authors' calculation based on Ministarstvo poljoprivrede Republike Hrvatske (2023a, 2024); TISUP (2025a). Annual changes in beef prices are shown.

Descriptive statistics in Table 7 show that beef has the highest arithmetic mean (€4.77) and median (€4.50), while pork has the lowest variability ($SD = €0.31$), indicating a more stable market in that category. Poultry is in the middle for both average price (€2.25) and variability ($SD = €0.50$).

Table 7
Descriptive Statistics of Meat Purchase Prices (€/kg)

Type of meat	Arithmetic mean (€)	Median (€)	Standard deviation (€)
Beef	4.77	4.5	0.80
Pork	1.84	1.7	0.31
Poultry	2.25	2.1	0.50

Note. Authors' calculation based on Ministarstvo poljoprivrede Republike Hrvatske (2023a, 2024); TISUP (2025a); TISUP (2025b).

Analysis of meat prices by period (2015–2020 and 2021–2024) in Table 8 showed a statistically significant increase in prices across all categories ($p < .05$). The median price of beef rose from €4.25 to €5.75, pork from €1.60 to €2.25, and poultry from €1.85 to €2.95. Beef had the largest absolute increase, while pork remained relatively stable. Poultry also

saw significant growth, reflecting rising production costs and market pressures after 2021. Overall, all three meat categories show a systematic upward trend in producer prices.

Table 8
Differences in Meat Purchase Prices by Period (€/kg)

Type of meat	Median (2015–2020) (€)	Median (2021–2024) (€)	<i>p</i>
Beef	4.25	5.75	<.05
Pork	1.60	2.25	<.05
Poultry	1.85	2.95	<.05

Note. Authors' calculation using Ministarstvo poljoprivrede Republike Hrvatske (2023a, 2024); TISUP (2025a); TISUP (2025b). Reported values are medians; *p* values were obtained using the Mann–Whitney *U* test.

The analysis of the average wholesale price of meat in Table 9 shows a steady increase in beef, pork, and poultry from 2015 to 2024. Beef rose from €4.60 in 2015 to €7.60 in 2024, pork from €2.00 to €3.20, and poultry from €2.20 to €3.90, reflecting rising market prices and distribution costs over the period.

Table 9
Average Wholesale Prices of Meat (€/kg) (2015–2024)

Year	Beef	Pork	Poultry
2015	4.6	2.0	2.2
2016	4.9	2.0	2.1
2017	5.2	2.1	2.3
2018	5.3	2.1	2.4
2019	5.4	2.2	2.5
2020	5.6	2.3	2.6
2021	6.0	2.5	2.8
2022	6.6	3.0	3.4
2023	7.2	3.1	3.7
2024	7.6	3.2	3.9

Note. Authors' calculation based on Ministarstvo poljoprivrede Republike Hrvatske (2023a, 2024); TISUP (2025a); TISUP (2025b).

Descriptive price analysis in Table 10 shows that beef had the highest average wholesale price in the observed period ($M = €5.95$, $SD = 1.02$), reflecting both the highest absolute value and greatest variability. Pork follows with an average of €2.44 ($SD = 0.40$), while poultry has a moderate average price ($M = €2.85$) and intermediate variability ($SD = 0.57$), indicating a more stable market trend compared to beef.

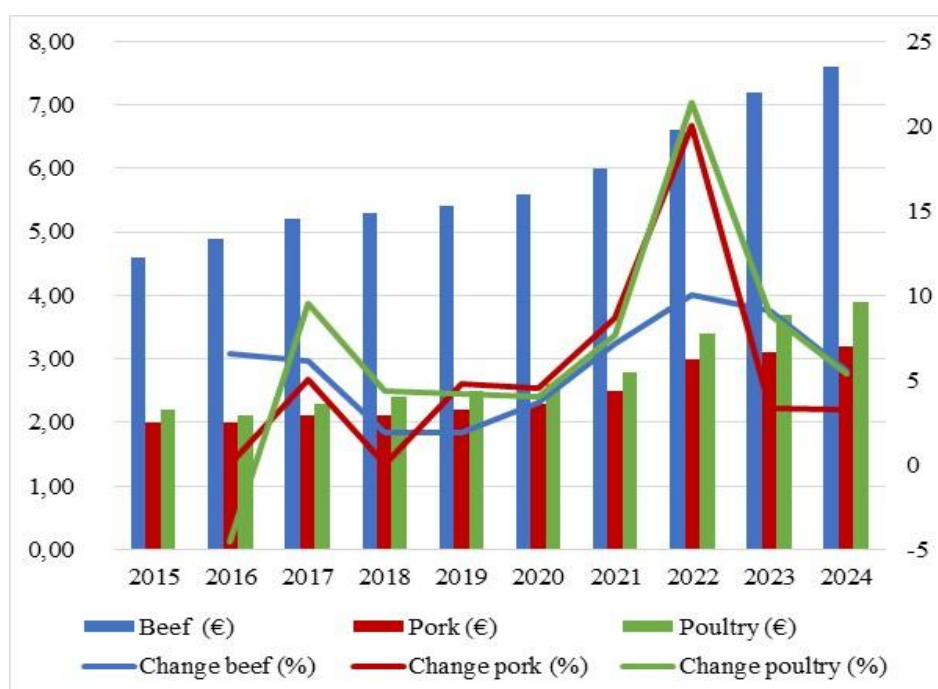
Table 10
Basic Descriptive Statistics (2015–2024)

Type of meat	Arithmetic mean (€/kg)	Median (€/kg)	Standard deviation (<i>SD</i>)
Beef	5.95	5.80	1.02
Pork	2.44	2.35	0.40
Poultry	2.85	2.70	0.57

Note. Authors' calculation based on Ministarstvo poljoprivrede Republike Hrvatske (2023a, 2024); TISUP (2025a); TISUP (2025b).

The data in [Figure 3](#) indicate a clear upward trend in meat prices between 2015 and 2024, although the dynamics differ across categories. Beef prices increased steadily from €4.60 in 2015 to €7.60 in 2024, with moderate annual growth rates that generally ranged between about 2% and 7%, before peaking at 10% in 2022 and then gradually stabilizing. Pork prices remained relatively stable in the earlier years, even showing no change in 2016 and 2018, but began to rise more noticeably after 2019, reaching €3.20 by 2024. The most pronounced growth occurred in 2022, when pork prices surged by 20%. Poultry prices followed a similar long-term upward trajectory, increasing from €2.20 to €3.90 over the observed period. Although poultry experienced a slight decline in 2016 (-4.55%), it subsequently recorded consistent growth, including the highest annual increase among the three categories in 2022 (21.43%). Overall, the results suggest a general inflationary pressure in meat markets during the period, particularly around 2021–2022, after which price growth moderated but remained positive across all categories.

Figure 3
Annual Changes in Meat Prices (2015–2024)



Note. Authors' calculation based on Ministarstvo poljoprivrede Republike Hrvatske ([2023a](#), [2024](#)); TISUP ([2025a](#)); TISUP ([2025b](#)). Values represent year-on-year percentage changes.

The index analysis in [Table 11](#) shows the cumulative growth of wholesale meat prices compared to the base year 2015 (index = 100). Beef reached an index of 165.2 in 2024, indicating a 65.2% price increase over nine years. Pork increased to 160.0 (a 60.0% rise), while poultry rose to 177.3, reflecting the highest relative growth. These results show that all three categories experienced a consistent upward trend, with particularly pronounced price increases after 2020. The data highlight long-term inflation in the meat market, with poultry showing the most accelerated growth, followed by beef and pork.

Table 11*Index Price Analysis (2015 = 100)*

Year	Beef (index)	Pork (index)	Poultry (index)
2015	100.0	100.0	100.0
2016	106.5	100.0	95.5
2017	113.0	105.0	104.5
2018	115.2	105.0	109.1
2019	117.4	110.0	113.6
2020	121.7	115.0	118.2
2021	130.4	125.0	127.3
2022	143.5	150.0	154.5
2023	156.5	155.0	168.2
2024	165.2	160.0	177.3

Note. Authors' calculation based on Croatian Bureau of Statistics (2024). Index values are expressed relative to the base year 2015 (2015 = 100).

A comparison of wholesale meat prices between two periods (2015–2019 and 2020–2024) in Table 12 shows a statistically and economically significant increase in all categories. Beef rose from a median of €5.2 to €6.6 (26.9%), pork from €2.1 to €3.0 (42.9%), and poultry from €2.3 to €3.4 (47.8%). Although beef had the largest absolute increase (€1.4), the relative growth was highest for poultry. The results indicate that the period after 2020 is characterized by faster price growth across all meat categories, reflecting long-term market inflation.

Table 12*Comparison of Wholesale Prices by Period*

Type of meat	Median 2015–2019	Median 2020–2024	Increase (€)	Increase (%)
Beef	5.2	6.6	1.4	26.9
Pork	2.1	3.0	0.9	42.9
Poultry	2.3	3.4	1.1	47.8

Note. Authors' calculation based on Ministarstvo poljoprivrede Republike Hrvatske (2023a, 2024); TISUP (2025a); TISUP (2025b). Reported values are medians expressed in €/kg.

The analysis in Table 13 shows that the differences in median wholesale meat prices between 2015–2019 and 2020–2024 are statistically significant for all three categories ($p = 0.0079$). Beef increased from €5.2 to €6.6, pork from €2.1 to €3.0, and poultry from €2.3 to €3.4. Although beef had the largest absolute increase, poultry had the highest relative growth. These results confirm that the period after 2020 is marked by accelerated price growth across all meat categories.

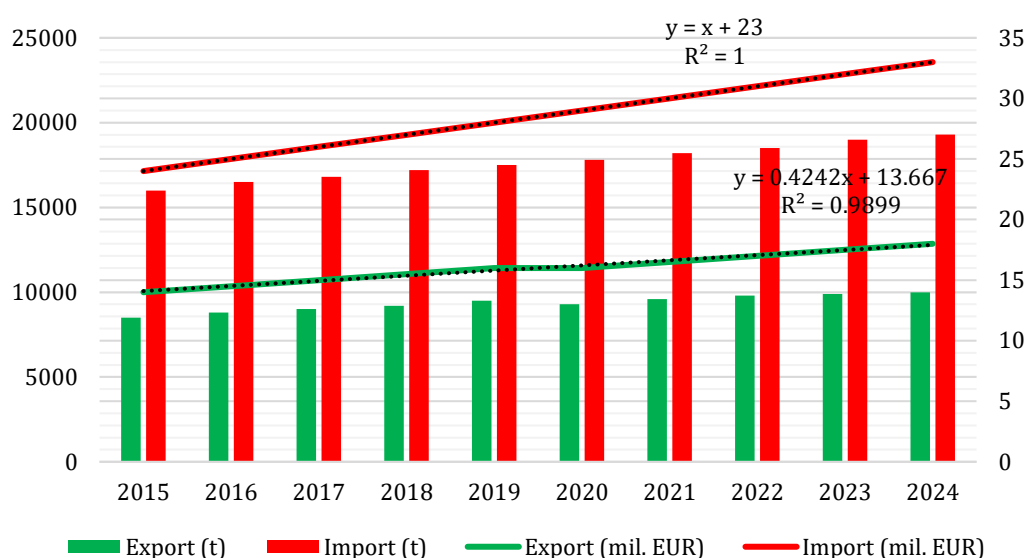
Table 13
Difference in Wholesale Meat Prices by Period

Type of meat	Median (2015–2019)	Median (2020–2024)	<i>p</i>
Beef	5.2	6.6	.0079
Pork	2.1	3.0	.0079
Poultry	2.3	3.4	.0079

Note. Authors' calculation based on Ministarstvo poljoprivrede Republike Hrvatske (2023a, 2024); TISUP (2025a); TISUP (2025b). Reported values are median wholesale prices in €/kg; *p* values were obtained using the Mann–Whitney *U* test.

Figure 4 presents data on poultry exports and imports in the period from 2015 to 2024. The quantities are shown in tons and the values in millions of euros, along with the calculated volume-value ratios (share of exports in relation to imports). During the observed period, a slight increase in both exports and imports is visible, but the volume-value ratios remain relatively stable.

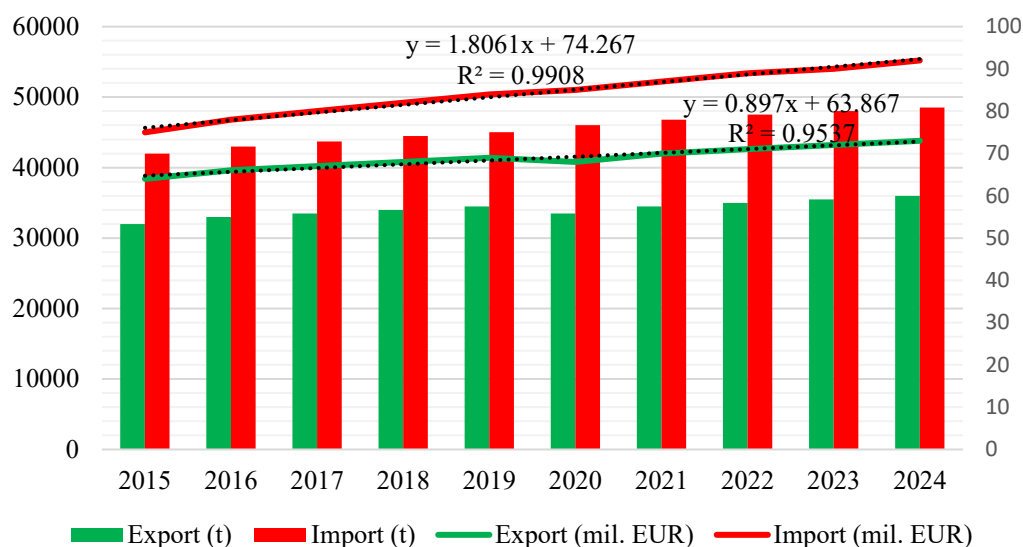
Figure 4
Foreign Trade in Poultry



Note. Authors' calculation based on TrendEconomy trade data for Croatia, HS 0207 (meat and edible offal of poultry, fresh, chilled or frozen) (TrendEconomy, n.d.-b). *t* = quantity in tons; € = value in million euros; quantity ratio = exports as a percentage of imports.

The analysis presented in Figure 5 shows an overview of pork exports and imports in the period from 2015 to 2024. During the observed years, there has been continuous growth in both exports and imports, while maintaining relatively high export-to-import ratios, which indicates a strong position of domestic pork production in the foreign market

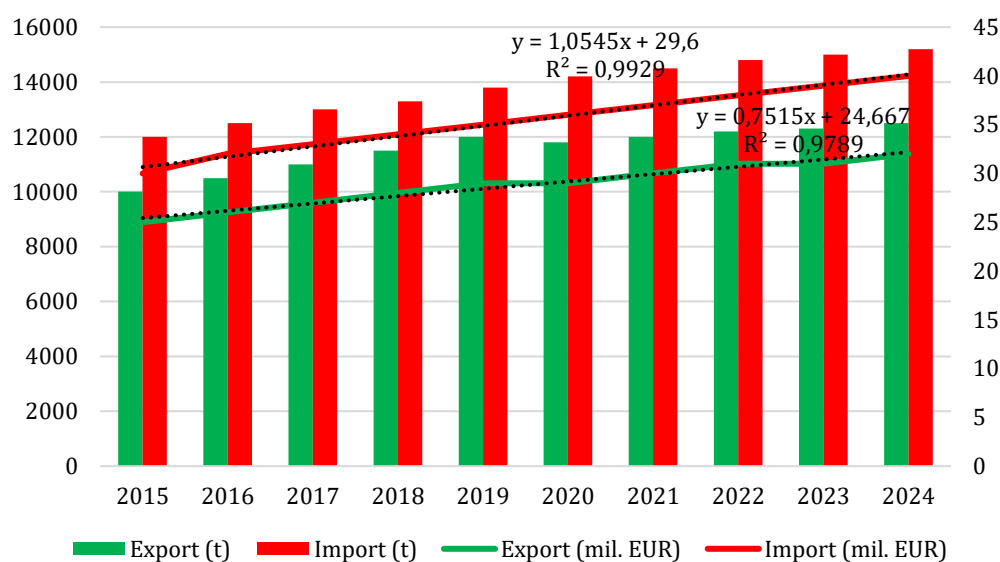
Figure 5
Foreign Trade in Pork



Note. Authors' calculation based on TrendEconomy trade data for Croatia, HS 0203 (meat of swine, fresh, chilled or frozen) (TrendEconomy, n.d.-c). t = quantity in tons; € = value in million euros; quantity ratio = exports as a percentage of imports.

Figure 6 shows the ten-year trend in beef exports and imports, expressed in quantity (in tons) and value (in millions of euros), and the ratio of exports to imports through the quantity and value ratios. The data show a stable trend of export growth, with a moderate increase in imports.

Figure 6
Foreign Trade in Beef



Note. Authors' calculation based on TrendEconomy trade data for Croatia, HS 0201 and HS 0202 (TrendEconomy, n.d.-d, n.d.-e). t = quantity in tons; € = value in million euros; quantity ratio = exports as a percentage of imports.

The analysis of meat exports in Table 14 shows higher average export levels in 2020–2024 than in 2015–2019 for all three meat categories. The largest absolute increase in export quantity was recorded for pork (+1,500 t). Statistically significant differences in both export quantity and value were found for poultry and beef ($p < .05$), while for pork only the difference in export value was statistically significant ($p = .0278$), whereas the difference in export quantity was not ($p = .0586$). In relative terms, beef recorded the largest increase in export quantity (10.5%), while poultry and beef shared the highest relative increase in export value (13.3%).

Table 14
Changes in Meat Exports (2015–2024)

Type of meat	Export t (2015– 2019)	Export t (2020– 2024)	Δt	$p (t)$	Export in € (2015– 2019)	Export in € (2020– 2024)	$\Delta €$	$p (€)$
Poultry	9 000	9 720	720	.0159	15.0	17.0	2.0	.0160
Pork	33 400	34 900	1 500	.0586	66.8	70.8	4.0	.0278
Beef	11 000	12 160	1 160	.0278	27.0	30.6	3.6	.0157

Note. Authors' calculation based on TrendEconomy trade data for Croatia, HS 0207, HS 0203, and HS 0201–0202 (TrendEconomy, [n.d.-b](#), [n.d.-c](#), [n.d.-d](#), [n.d.-e](#)). Values represent average annual exports for the periods 2015–2019 and 2020–2024. t = quantity in tonnes; € = value in million euros; p values were obtained using the Mann–Whitney U test.

The analysis presented in Table 15 shows that average annual meat imports were higher in 2020–2024 than in 2015–2019 for all three meat categories, both in quantity and value. According to the Mann–Whitney U test, these differences were statistically significant for all indicators ($p = .0079$). The largest absolute increase in import quantity was recorded for pork, while the largest relative increase in import value was observed for poultry. Overall, the results indicate growth in meat imports over the observed period.

Table 15
Changes in Meat Imports (2015–2024)

Type of meat	Import in t (2015– 2019)	Import in t (2020– 2024)	Δt	$p (t)$	Import in € (2015– 2019)	Import in € (2020– 2024)	$\Delta €$	$p (€)$
Poultry	16 800	18 560	1 760	.0079	26.0	31.0	5.0	.0079
Pork	43 640	47 360	3 720	.0079	79.8	88.6	8.8	.0079
Beef	12 920	14 740	1 820	.0079	32.8	38.0	5.2	.0079

Note. Authors' calculation based on TrendEconomy trade data for Croatia, HS 0207, HS 0203, and HS 0201–0202 (TrendEconomy, [n.d.-b](#), [n.d.-c](#), [n.d.-d](#), [n.d.-e](#)). Values represent average annual imports for the periods 2015–2019 and 2020–2024. t = quantity in tons; € = value in million euros; p values were obtained using the Mann–Whitney U test.

5. Discussion

The increase in milk prices during 2021–2023 follows the pattern observed in European and global dairy markets after 2020. Reports from the FAO and European Commission attribute this period to disrupted supply chains, higher feed and energy costs, and additional pressure from the 2022 geopolitical shock (European Commission, 2024; FAO, 2023; FAO, 2025). Similar findings appear in broader studies of European farming systems, where the post-

pandemic period revealed weak adaptive capacity under market and input instability (Meuwissen et al., 2021). The decline recorded in 2024 is therefore not unexpected. It aligns with later signs of easing in commodity and input markets after the peak pressures of 2022 (FAO, 2023; OECD, 2022). In the Croatian case, however, price movements cannot be explained by external shocks alone.

The domestic pattern must be considered in light of the structure of Croatian livestock production. Previous studies highlight fragmented farm structures, smaller production units, lower capital intensity, and slower technological adjustment compared to more competitive EU systems (World Bank, 2019; Hadelan et al., 2022). This environment leaves less capacity to absorb sudden increases in feed, energy, and logistics costs and limits the potential for adjustment through productivity growth. This aligns with broader evidence on structural change in newer EU member states, where farm restructuring is closely linked to prices, subsidies, income conditions, and macroeconomic factors (Neuenfeldt et al., 2019). For milk production, this also affects pricing. The gap between purchase and wholesale prices is not only a descriptive market outcome; it is related to pricing management, margin formation, and the constraints producers face under technological and policy limitations (Deže et al., 2022).

The meat sector showed a steadier pattern than the milk sector. Prices rose in all observed meat categories, but more gradually than in milk. Beef had the largest absolute increase, while poultry had the largest relative increase compared with the base period. The results also show that imports increased across all meat categories. A possible explanation is that poultry production is usually more intensive and more closely organized within the supply chain, so price changes can spread faster, while beef and pork production adjust more slowly because they are more strongly tied to biological cycles (Kranjac et al., 2021). The trade results are also in line with earlier findings that stronger market integration exposed structurally weaker parts of Croatian agriculture to greater foreign competition and import dependence (Kranjac et al., 2020; Rukavina, 2022). Similar conclusions have been reported in more recent work on food supply chains and market organization (Mikulić et al., 2023).

The trade results should still be interpreted with caution. Lower import prices or persistent price gaps may indicate competitiveness issues and cost asymmetries, but they do not by themselves prove dumping. Croatian literature on unfair trading practices warns against equating market imbalance with unlawful conduct without a more detailed examination of contractual relations and market power (Butorac Malnar et al., 2021). The same caution applies here. A legal assessment of dumping would require exporter-level information on prices, costs, and subsidies, which is not available in the current dataset (World Trade Organization [WTO], n.d.). For this reason, the trade findings are better understood as evidence of competitive pressure and rising import dependence rather than proof of unfair trade practices. From a business excellence perspective, the results highlight the importance of process efficiency, pricing management, and stronger value chain coordination in sectors facing persistent cost pressures and external market shocks.

The analysis is limited by the use of aggregated annual data. While such data are sufficient for identifying medium-term trends, they do not reveal short-term price transmission, seasonal variation, or differences among individual producers, processors, and marketing channels. Some series are incomplete, especially for wholesale milk prices, and the available data do not include farm-level costs, margins, productivity indicators, or firm-level trade information. Further research would benefit from monthly series, farm-level or firm-level data, and comparisons with other Central and Eastern European member states. This would allow for a closer examination of price transmission, cost competitiveness, and differences in adjustment across livestock subsectors.

6. Conclusion

We examined changes in the Croatian milk and meat sectors between 2015 and 2024, with a focus on prices, trade, and competitiveness. Milk prices were fairly stable until 2020, after which they increased sharply. The strongest yearly increase was recorded in 2022 (25.69%), while a slight decline followed in 2024 (–3.61%). Meat prices also increased in all observed categories, but the trend was more gradual than in the milk sector. Beef recorded the largest absolute increase, while poultry showed the highest relative growth. During the same period, imports of both milk and meat generally grew faster than exports, showing greater reliance on foreign supply and continued weakness in domestic livestock production. The period after 2020 clearly differed from the earlier years. External shocks affected the market, but their effects were stronger because the sector was already facing long-standing problems. These include fragmented production, lower investment capacity, and a limited ability to react to sudden changes in prices and trade conditions. This means that competitiveness in the Croatian milk and meat sectors will depend not only on output and price movements, but also on the ability of producers, processors, and other actors in the value chain to improve efficiency, control costs, and respond better to further market pressures.

The article is relevant to UN Sustainable Development Goals:



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